

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
16 September 2004 (16.09.2004)

PCT

(10) International Publication Number
WO 2004/079796 A3

(51) International Patent Classification⁷: **H01L 21/316**,
21/314, 29/51, C23C 16/40, H01L 21/28, 21/8242

[US/US]; 639 Quaker St., Chappaqua, NY 10514 (US).
FORBES, Leonard [US/US]; 965 NW Highland Terrace,
Corvallis, OR 97330 (US).

(21) International Application Number:
PCT/US2004/006685

(74) Agents: **STEFFEY, Charles, E.** et al.; P.O. Box 2938,
Minneapolis, MN 55402 (US).

(22) International Filing Date: 4 March 2004 (04.03.2004)

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/379,470 4 March 2003 (04.03.2003) US

(71) Applicant (*for all designated States except US*): **MI-
CRON TECHNOLOGY INC.** [US/US]; 8000 South
Federal Way, Boise, ID 83716-9632 (US).

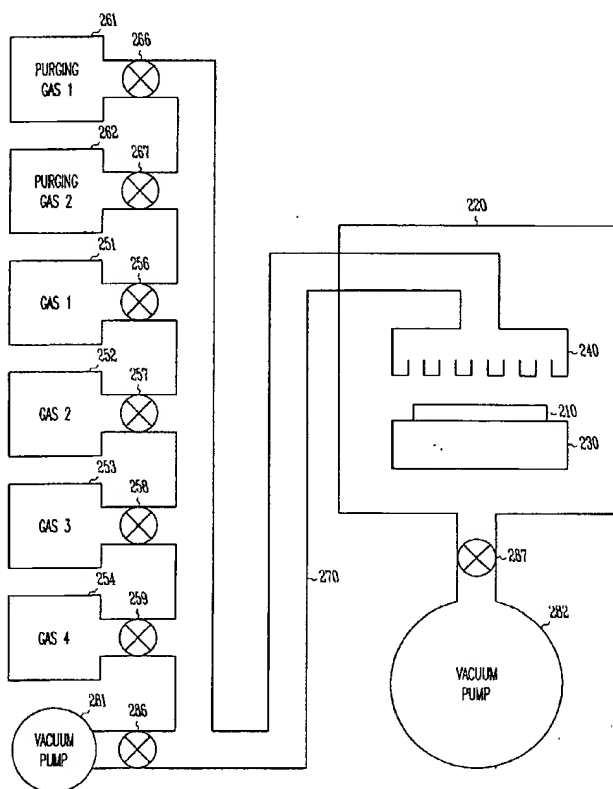
(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **AHN, Kie, Y.**

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),

[Continued on next page]

(54) Title: ATOMIC LAYER DEPOSITED DIELECTRIC LAYERS



(57) Abstract: An atomic layer deposited dielectric layer and a method of fabricating such a dielectric layer produce a reliable dielectric layer having an equivalent oxide thickness thinner than attainable using SiO₂. Depositing a hafnium metal layer on a substrate surface by atomic layer deposition and depositing a hafnium oxide layer on the hafnium metal layer by atomic layer deposition form a hafnium oxide dielectric layer substantially free of silicon oxide. Dielectric layers containing atomic layer deposited hafnium oxide are thermodynamically stable such that the hafnium oxide will have minimal reactions with a silicon substrate or other structures during processing.



Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *with international search report*

(88) Date of publication of the international search report:

10 February 2005

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/006685

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L21/316 H01L21/314 H01L29/51 C23C16/40 H01L21/28
H01L21/8242

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L C23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y		5-11, 14-20, 23-54, 56-58, 60-73
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

3 November 2004

Date of mailing of the international search report

23/11/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Klopfenstein, P

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US2004/006685

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YAMAMOTO KAZUHIKO ET AL: "Effect of Hf metal predeposition on the properties of sputtered HfO ₂ /Hf stacked gate dielectrics" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 81, no. 11, 9 September 2002 (2002-09-09), pages 2053-2055, XP012031905 ISSN: 0003-6951 page 2053; figure 1 page 2054, left-hand column; figure 2 page 2055	55-62
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A		63-73
X	US 5 745 334 A (MAHMOUD ISSA SAID ET AL) 28 April 1998 (1998-04-28) column 2, line 36 - line 58; figure 1A	1,5
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A		1-4
X		1-4,12,
Y		13,55
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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/006685

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	HOSHINO Y ET AL: "Characterization and control of the HfO ₂ /Hf/Si (001) interfaces" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 81, no. 14, 30 September 2002 (2002-09-30), pages 2650-2652, XP012032094 ISSN: 0003-6951 the whole document	55-62
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